

Science Goals of the Space Interferometry Mission

S. C. Unwin, A. F. Boden, M. Shao (Caltech/JPL)

The Space Interferometry Mission (SIM) will be NASA's first space-based optical interferometer. SIM will produce a wealth of new astronomical data and serve as a technology pathfinder for future astrophysics missions. It uses a Michelson interferometer to provide 4 microarcsecond precision absolute position measurements of stars as faint as 20th magnitude. This level of precision will revolutionize the field of astrometry, improving on the best currently available measures by 2 to 3 orders of magnitude. SIM will also provide synthesis imaging in the visible waveband to a resolution of 10 milliarcsec, and interferometric nulling of an on-axis star to 10^{-4} .

SIM is a key mission in NASA's Origins Program. Its goals are very broad, covering many important areas of astrophysics, including: searching for other solar systems, and studying the processing of star and solar system formation; studying the dynamics of star and star clusters in our Galaxy; calibrating distance and age indicators used for the cosmic distance scale; and probing the dynamics and evolution of active galaxies.

Most of these programs make use of SIM's unique capability to perform precision astrometry over wide fields - which cannot be done from the ground. Using global astrometry, SIM will measure parallax distances not just in our solar neighborhood, but anywhere in our Milky Way Galaxy to 10%, and even out to our nearest neighbor galaxies - the Large and Small Magellanic clouds. This paper will describe some of the exciting science which SIM will enable.